REMARKS/ARGUMENTS

Reconsideration of the above application in view of the below remarks is requested. Claim 8 has been amended to add the word 'claim' before '1'.

In the Office Action, the Patent Office rejected claims 1 to 8 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fuller (US 4557797) in view of Fedynyshyn (US 2003/0099897) and Haoying Li (J. Nanoparticle Research); rejected claims 9 to 13 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Choi (US 6954275) in view of Fuller (US 4557797), Fedynyshyn (US 2003/0099897) and Haoying Li (J. Nanoparticle Research); and rejected claim 14 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Choi (US 6954275) in view of Fuller (US 4557797), Fedynyshyn (US 2003/0099897) and Haoying Li (J. Nanoparticle Research) and further in view of Kropewnicki (US 6440864). These rejections are traversed.

Regarding the rejection of claims 1 to 8 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fuller (US 4557797) in view of Fedynyshyn (US 2003/0099897) and Haoying Li (J. Nanoparticle Research), applicants point out that Fuller discloses a photolithographic process, wherein a first planarizing photoresist layer, which is essentially PMMA (poly methylmethacrylate), and an antireflective coating layer are applied, and then a top photoresist layer is deposited, which is subjected to patterned irradiation (See, for example, claim 1 of Fuller). At column 2, lines 50 to 53 of Fuller, it is stated that novolak-based resists have a better plasma etch resistance than PMMA; however, novolak-based materials are not disclosed as planarizing layers. A micro patterned arrangement obtained by the process in Fuller differs from applicants' invention.

First, Fuller does not disclose a bottom coat comprising an aromatics containing polymer or copolymer (which can be etched by O_2 but not by a CHF_3/O_2 plasma). The PMMA disclosed by Fuller does not comprise aromatics.

Second, Fuller requires an antireflective layer between PMMA and the top photoresist (see column 3, lines 17-20). Such an antireflective layer is not present in applicants' microlithographic arrangement and is not necessary since applicants' microlithographic arrangement is not prepared by a photolithographic process.

Third, applicants' top layer is not a photoresist (that is, a light sensitive material that becomes either soluble or insoluble in a developer medium upon irradiation). According to Fuller, the patterned top layer is formed by applying a coating of a photoresist which is afterwards patterned by irradiation through a mask and subsequent development. According to applicants' invention, their top layer is already applied as a pattern through the microstructured stamp. Therefore, the top layer of applicants' invention is different from the top photoresist of Fuller. Applicants' microstructured top layer after removal of the stamp is no longer light sensitive as opposed to the patterned top photoresist of Fuller which is light sensitive.

In addition, the top photoresist of Fuller has a different functionality and neither teaches or suggests polymerizable silianes or nanoscale particles of applicants' invention. Accordingly, the process of Fuller results in a completely different kind of micropatterned arrangement than the one according to applicants' invention.

Fedynyshyn discloses a photoresist comprising encapsulated inorganic particles to increase the plasma etch selectivity of the resist. The encapsulated material

comprises inorganic core particles at least partially coated with a moiety having a protected acidic group such that upon deprotection, the encapsulated material exhibits greater base solubility.

Fedynyshyn discloses that the inorganic particles can be surface modified with organosiloxane ring compounds comprising protected acid groups, but does not disclose polymerizable silanes as a dispersing agent (solvent)) for the nanoparticles.

Even though the top layer of Fuller is a photoresist and Fedynyshyn discloses a modified photoresist, even if a skilled artisan were to combine these documents, applicants' invention would not result since applicants' nanocomposite composition is not a photoresist and comprises polymerizable silanes as a dispersing agent, something which neither Fuller nor Fedynyshyn disclose or suggest.

Even with Li, a skilled artisan would not arrive at applicants' invention. Li discloses inorganic-organic nanocomposite coatings comprising homogeneously nanosized ZnO particles incorporated into an inorganic-organic hybrid matrix derived from tetraethoxysilane (TEOS) and 3-glycidoxypropyltrimethoxysilante (GLYMO). The coatings are prepared on PMMA substrates and are dense flexible abrasion resistant and UV absorbing. The coatings can be used to provide UV resistance and abrasion resistance, in particular to objects made from PMMA. The nanocomposite coatings of Li are not a photoresist material, that is, they do not comprise any light sensitive compound that alters their solubility in a developer upon irradiation. Furthermore, Li is silent on a possible application of such compounds in microstructuring electronic components.

In addition, Li does not provide for particles that are partially coated with a moiety having a protected acidic group or acid labile group. The ZnO of Li is coated with SiO_2, which is not a protected acidic group or acid labile group required by Fedynyshyn. Skilled artisans would not look to Li in order to augment the disclosure of Fedynyshyn given that Li fails to suggest, teach or disclose useable particles of Fedynyshyn. Since Fedynyshyn requires its particles to be coated with a protected acidic group or acid labile group, a skilled artisan would not substitute the particles of Fedynyshyn with those of Li.

Moreover, Fedynyshyn states that the EIRT resist concept is a candidate for both single layer resists and the top imaging layer of bilayer resists (see [0164]). However, Fuller states that "... the sestertius-layer resist process of the present invention differs from a bilayer resist process by introducing a thin AR film between the bottom PMMA layer and the top photoresist layer. ... The interface layer problem in the regular bilayer resist process is also eliminated because the AR coating does not interact with either the PMMA or the conventional positive photoresist." Additional benefits to Fuller's invention are also stated. See column 7, lines 29 to 56 of Fuller.

Given that Fuller states that it is different from the bilayer process and his process achieves better results than a bilayer system, a skilled artisan would not look to Fedynyshyn given Fedynyshyn's possible bilayer use since Fuller has improved the bilayer approach and Fedynyshyn would only be a step backwards.

A skilled artisan is not provided any motivation to combine Li with Fuller and Fedynyshyn to replace the top photoresist of Fuller with the nanocomposite coating of Li since such a coating is not a photoresist and cannot be patterned by the photolithographic methods as required by Fuller's process. Furthermore, the

combination of Fuller, Fedynyshyn, and Li do not provide any motivation to discard the antireflective layer in Fuller or require that the bottom coat comprise an aromatics containing polymer or copolymer.

It appears that the Patent Office is engaging in hindsight as a basis for combining the documents. The Patent Office admits that Fuller is silent about polymerizable silanes and nanoscale particles in the Office Action. Thus, there can be no motivation available to a skilled artisan to replace the Fuller material with that of either Fedynyshyn or Li without referencing applicants' specification, which of course is not permitted. There is nothing in Fuller, Fedynyshyn, or Li as a whole to suggest any desirability in combining these documents. The rejection over Fuller in view of Fedynyshyn and Li is traversed and withdrawal thereof is requested.

Regarding the rejection of claims 9 to 13 as allegedly being unpatentable over Choi (US 6954275) in view of Fuller (US 4557797), Fedynyshyn (US 2003/0099897) and Haoying Li (J. Nanoparticle Research), the Patent Office is of the opinion that Choi discloses all the steps of applicants' process except for a sol film made of the nanocomposite material of applicants' invention. This is not the case.

Choi is directed to a high precision gap and orientation measurement method between a template and a substrate used in imprint lithography processes. The disclosed process of Choi is different from that of applicants.

According to Choi's process (Fig. 2A to 2E), a template 12 is oriented in spaced relationship to the substrate 20 so that a gap 31 is formed in the space separating template and substrate. The gap is then filled with a substance 40 that conforms to the shape of the template (which may have been pre-treated to form a separation assisting

layer 14). Substance 40 is preferably a liquid so that it may fill the space of gap 31 rather easily and quickly without the use of high temperatures and the gap can be closed without requiring high pressures. The substance is then cured and the template removed (see column 9, lines 19 to 49). At column 13, lines 1 to 50, it is disclosed that the liquid preferably has a low viscosity, ranging from about 0.01 cps to about 100 cps.

In contrast to Choi's process, applicants' process comprises the step of i) production of a planar uncured sol film of the nanocomposite, that is, the material to be transferred. Choi is not only completely silent on nanocomposites, but also on sols. The only reference to the substance forming the printed pattern is to the "material" or to a "liquid". Further, step i) is missing from Choi's process because in his process, the liquid is filled into the gap between the template and the substrate, not transferred by a stamp. Accordingly, also step iii) - transfer of sol film material from step i) to the bottom coat by means of a microstructured transfer imprint stamp is missing in Choi. Not only is the step missing, but the requirements to the print material are also different. The materials of Choi need to have low viscosity while the material of applicants' invention need to stick to the transfer imprint stamp in order to allow for the transfer of the material to the bottom coat of the substrate.

Accordingly, the process of Choi differs from applicants' process in at least process steps i) and iii). Furthermore, it would not have been obvious to use the nanocomposite material of applicants' invention in the process of Choi because Choi's process has totally different requirements regarding the properties of the printing material.

Fuller, Fedynyshyn, and Li are discussed above.

A skilled artisan would not combine the aforementioned documents with Choi because the processes therein and Choi are mutually exclusive. For example, Fuller discloses a lithographic process employing photoresist to obtain a patterned substrate while Choi discloses a microimprint process, although not a transfer microimprint process, where the pattern is formed on the substrate by the printing process and not by a photolithographic process of Fuller. In addition, given that a skilled artisan would not combine Fuller with Fedynyshyn and Li, given the process of Choi, there is still no motivation to combine. Again, the Patent Office is engaging in hindsight. The rejection is traversed and withdrawal thereof is requested.

Regarding the rejection of claim 14 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Choi (US 6954275) in view of Fuller (US 4557797), Fedynyshyn (US 2003/0099897) and Haoying Li (J. Nanoparticle Research) and further in view of Kropewnicki (US 6440864), applicants note that Choi, Fuller, Fedynyshyn, and Li are discussed above.

Kropewnicki discloses a substrate cleaning method where a substrate is exposed to an energized process gas to remove residues and resist material from the substrate. The process gas comprises a cleaning gas, preferably oxygen, and an additive gas, preferably ammonia.

Kropewnicki is completely silent on the microlithographic arrangement of applicants' invention and the process for producing it. As has been shown above, Choi, Fuller, Fedynyshyn and Li fail to make applicants' process obvious and Kropewnicki adds nothing to the combination. Kropewnicki only generally discloses the use of certain etchant gases, including oxygen and CHF_3, but fails to disclose applicants' two step etching process - etching of the residual layer of the nanocomposite sol film with a

CHF_3/O_2 plasma, and etching the bottom coat with an O_2 plasma. Again, the Patent Office is engaging in hindsight. Thus, the rejection is traversed and withdrawal thereof is requested.

Applicants submit that the concerns of the Patent Office have been addressed. Withdrawal of the rejections and issuance of a Notice of Allowance is respectfully solicited.

Respectfully submitted,

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